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Low-energy Electrodynamics of non-Drude Transport in the Strongly Correlated Ferromagnetic Metal $SrRuO_3$ YOUCHENG WANG, G. BOSSE, Y. LUBASHEVSKY, J. P. SHECKELTON, The Institute for Quantum Matter, Johns Hopkins Univ., D. E. SHAI, Laboratory of Atomic and Solid State Physics, Dept. of Physics, Cornell Univ., C. ADAMO, Dept. of Materials Science and Engineering, Cornell Univ., D.G. SCHLOM, Dept. of Materials Science and Engineering, Kavli Institute at Cornell for Nanoscale Science, Cornell Univ., K. M. SHEN, Laboratory of Atomic and Solid State Physics, Dept. of Physics, Kavli Institute at Cornell for Nanoscale Science, Cornell Univ., N. P. ARMITAGE, The Institute for Quantum Matter, Johns Hopkins Univ. — While the highly correlated complex oxide perovskite ferromagnet $SrRuO_3$ has been studied for decades, interest remains in its unusual transport properties. Here we report time-domain THz conductivity measurements taken from room temperature down to 1.5 K on a low disorder film of $SrRuO_3$. Previous optical measurements have shown a deviation from Drude-like transport in this material. We investigate these deviations using an extended Drude model analysis and find evidence for an effective non-Fermi liquid-like behavior in the frequency dependence of the scattering rate. The high quality of our film, reflected in its large residual resistivity ratio, allows us to better isolate the inelastic scattering channels. We have also extended these experiments down to the microwave regime and in this context investigate possible origins of this non-Drude transport, including the possibility of very low frequency interband transitions that are caused by small octahedral rotations and tilting that are inherent in the class of materials.

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